PROCEEDINGS
OF THE
ROYAL SOCIETY OF EDINBURGH.

VOL. II. 1847-8. No. 32.

Sixty-Sixth Session.

Monday, 20*th March* 1848.

Dr CHRISTISON, V.P., in the Chair.

The following Communications were read :—

1. On an Instrument for measuring the extensibility of Elastic Solids. By Professor Forbes.

This instrument is almost a faithful reproduction of S'Gravesande's apparatus described in his "Physices Elementa Mathematica," 1742 (but not in the previous editions). It is described or alluded to by few modern writers, except Biot in his "Traité de Physique." It consists of a strong wooden table or frame, with a vice at each end, between which a wire or lamina may be stretched with a determinate tension by means of a weight attached by a cord, passing over a pulley in the manner of the musical apparatus, called a Monochord. After the tension is adjusted, both vices are screwed fast, the space included between them being exactly 50 inches. If now, any deviation of the middle point of the wire included by the vices be made (similar to the action of sounding a harp-string), the force required to pull it a certain distance aside will depend, 1*st*, on the length of the wire; 2*d*, on its tension; 3*d*, on its extensibility, or the modulus of elasticity.

S'Gravesande employed his apparatus to verify Hooke's law, that the extension is as the extending force within the limits of perfect elasticity. But it does not seem to have occurred to him, nor (singularly enough) to later experimenters, to deduce from the forces required to produce given deviations, the specific extensibility, or what Dr Young calls the *Modulus of Elasticity* of the body.

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It is essential that the deviation from the rectilinear position of the wire should be ascertained with great nicety, and S'Gravesande's contrivance effects this in a very neat and satisfactory way. A fine steel chain attaches by a hook to the middle point of the extended wire, the other end being secured to the circumference of a nicely centred wheel. Another chain attached similarly to the wire of the same wheel, has a scale attached to it, a weight placed in which causes the wheel to revolve, and by means of the first chain and hook, pulls the wire out of the straight line. A long index fixed to the same axis with the wheel, points out the deviation on a much magnified scale, referred to a divided semicircle of brass. Thus a weight being placed in the scale, the corresponding deviation is instantly shewn.

Let P be the weight in the scale, D the deviation of the wire, s = *half* the length of the wire between the vices; it was proved in this communication that,

$$P = 2T\frac{D}{s} + M\left(\frac{D}{3}\right)^3$$

where M is the *modulus of elasticity*, measured in grains which is easily reduced to the equivalent length of a similar wire or lamina, according to Dr Young's definition. This is on the supposition that Hooke's Law of Elasticity (the extension is as the extending force) is correct; and that law is verified if the term $M\left(\frac{D}{s}\right)^3$ be found for the same wire practically to vary as the cube of the deviation. The value of M, the modulus, is also at once given by a single observed deviation, the tension being known.

A small correction in the value of P is to be made, for the weight of the wire deflecting it from a straight line. This small correction had not escaped the notice of S'Gravesande when he verified Hooke's law.

Example.—A steel pianoforte wire, tension 50,000 grains = T; s = 25 inches.

Values of D.	Values of P.	$2T\frac{D}{s}$	$M\left(\frac{D}{s}\right)^3$
·25 inch	1100 grains	1000	100
·50 ...	2720 ...	2000	720
·75 ...	5400 ...	3000	2400

The numbers in the last column should vary as the cubes of those in the first, or be as 1, 8, 27. If we deduct 10 grains from each of them for the action of the weight of the wire depressing itself, we shall have these numbers—

90 710 2390

dividing respectively by 1, 8, and 27,

90 89 88·5

Hence the mean result for $M\left(\frac{D}{s}\right)^3$ for $D = \cdot 25$, or $\frac{D}{s} = \frac{1}{100}$, is nearly 89 grains, consequently,

$$\frac{M}{(100)^3} = 89$$

and $M = 89{,}000{,}000$ grains.

But a foot in length of the wire in question weighs 11 grains. The equivalent modulus of elasticity is therefore very nearly 8,000,000 feet of the wire in question, which agrees closely with the received numbers for steel-wire.

2. On the Anthracite of the Calton Hill. By Dr Fleming.

The occurrence of anthracite in this locality has been noticed and recorded by several observers, who seem to have overlooked some of its more remarkable peculiarities. At present, this mineral may be detected in a series of anastomosing vertical veins of calcareous spar, including, at the same time, angular portions of the claystone porphyry in which they are situate, on the upper north walk on the north side of the Observatory. The anthracite occurs, 1. In rounded, drop-like pieces, on which the calcareous spar has been moulded, not unlike the colophonite of Norway. 2. In masses with plane surfaces, apparently produced by the laminæ of the surrounding spar. 3. In angular masses, with sharp edges, and a conchoidal fractured surface. The drop-like pieces must have been solid previous to the solidification of the spar, while the flattened masses have yielded to the pressure of its crystallization. The angular masses, however, which are the most numerous, occur crowded together, of different sizes, while the neighbouring fragments unequivocally indicate, by their corresponding shape, that they had been broken when in a hard state, and separated in the very spot they now occupy, being suspended in the calcareous parts which afterwards became spar. The author exhibited analogous examples of fractures and separations in the Beryl and Tourmaline.

The author next adverted to the opinion, that the Calton was a mass of trap which had burst through the coal formation; and that the anthracite was the altered bitumen, which the rising trap had enveloped in its passage. But, in opposition to these views, although countenanced by Jameson, Cunningham, and Milne, he stated that the Calton, with the exception of its two small *trap dykes*, consisted of a series of sedimentary matters or strata, which had been assorted by water; and that, in position, these strata occupied a place far below the mountain limestone, as is demonstrated by their dip and connection with the group extending under the coal measures from the Castle Hill to Joppa, which he had no hesitation in referring to the old red sandstone.

3. On some Phenomena of Capillary Attraction observed with Chloroform, Bisulphuret of Carbon, and other Liquids. By Dr George Wilson.

The object of this communication was to bring before the Society some phenomena which are exhibited when certain liquids, denser than water, are exposed, while contained in glass or porcelain vessels, to the alternate action of acids and alkalies. The liquids with which the phenomena described were noticed, were chloroform, bisulphuret of carbon, Dutch liquid (C^4 H^4 Cl^2), bromine, oil of cloves, of sassafras, of cinnamon, and of bitter almonds. The majority of the experiments were made with chloroform, and the phenomena presented in common by all the liquids mentioned were described in full, as presented by chloroform.

When that fluid is dropped into water, contained in a glass or glazed porcelain vessel, it falls to the bottom as a brilliant, highly mobile globule. If potass, soda, or ammonia, be now added, the globule at once collapses, sinks as if pressed down by the alkali, and flattens out on the bottom of the containing vessel. On slightly supersaturating the alkali with an acid, the flattened chloroform recovers, with great rapidity, its globular shape, as if suddenly relieved from pressure.

When the acid in its turn is supersaturated with alkali, the flattening again occurs; and by alternating the addition of these re-agents, the same globule may be successively flattened and rounded for any number of times.

If the experiments referred to be made with quantities of chloroform sufficiently large to touch the walls of the containing vessel on every side, and to form a stratum of some depth, the effect of adding alkaline water is to give the chloroform a surface apparently horizontal, and the addition of acids makes its upper boundary highly convex.

Change in configuration, however, is not the only alteration which the globule of chloroform undergoes. Several of its physical properties are strikingly modified by its contact with aqueous solutions of acids and alkalies. When these are alternately made to act on chloroform at the bottom of a flat white porcelain vessel, which admits of the resulting phenomena being distinctly observed, the reagents in question change the sensible characters of the denser liquids in the following way. Under acidulated water the globules are brilliant, very mobile, and obedient to the solicitation of gravity. Detached globules, when they meet, readily run together, and scarcely one is to be seen without a bubble of air attached to its upper surface, and adhering tenaciously. Under alkaline water, on the other hand, the globules of chloroform spread out into flat discs, with rounded edges; or elongated into irregularly ovoidal or flattened cylindrical forms, which vary their shapes on the slightest impulse. These flattened globules are, moreover, much less mobile than the rounded ones under acid. They move sluggishly, cling to the vessel, and leave a tail behind them when urged to move rapidly. Their brilliancy is sensibly diminished, and no air-bells adhere to their upper surfaces.

Chloroform admits of being coloured by digestion on litmus, alkanet root, &c. &c. Globules of the coloured liquid flatten out greatly more under alkalies than the colourless chloroform does, so that blue or red globules spread over an irregular area five or six times greater than they occupy under acids. Their apparent viscidity, loss of mobility and of brilliancy, are also more marked than when colouring matter is absent.

Phenomena similar to those noticed with the colourless chloroform were observed with the several liquids previously mentioned. The author, in conclusion, declined to enter on the theory of the phenomena described, further than to ascribe an important share in their production to the action of lighter and heavier liquids on each other.

The following Gentlemen were duly elected Ordinary Fellows:—

Henry Davidson, Esq.
Rev. J. Hannah, M.A.

The following Donation to the Library was announced:—

First Report on the Coals suited to the Steam Navy. By Sir Henry De la Beche and Dr Lyon Playfair. Fol.—*By Sir Henry De la Beche.*

Monday, 3d April 1848.

Sir THOMAS MAKDOUGALL BRISBANE, Bart., President, in the Chair.

The following Communications were read:—

1. Notice of the Orbit of the Binary Star α Centauri, as recently determined by Captain W. S. Jacob, Bombay Engineers. By Professor C. P. Smyth.

The object of this paper is to point out the extremely important and interesting characteristics of the orbit of the two stars of α Centauri round their centre of gravity, with the object of procuring as many observations as possible from southern observers during the periastral passage in 1851·5.

Professor Henderson and Sir J. Herschel, the only two observers who had specially applied themselves to the subject previously to Captain Jacob, were not able to make any thing of it, with such materials as had been accumulated up to their time. They merely ventured to predict, that a very close affinity of the two stars might be expected about the year 1867; and both seemed to consider that the period of revolution was something very great,—that the star was increasing in distance at the time that it was observed by Lacaille in 1751, and by Maskelyne in 1761; and that it had occupied the intervening time in reaching its maximum distance, without any sensible change of angle of position.

Sir J. Herschel, in concluding his review of the subject, said, "that no subject more worthy of continued and diligent attention could possibly be urged on the attention of southern astronomers;" and this has since been most eminently borne out by Captain Jacob's observations, which, beginning about the time that Sir John left off (1838), have been continued up to the present year. All the conclusions, indeed, ventured on by former authorities have turned out erroneous; but the close approximation to the truth now obtained exhibits far more interesting features than were ever expected. At the epochs of Lacaille and Maskelyne, the distance was on the decrease, instead of the increase; and the stars were seen in almost exactly the same relative position by the latter observer in 1761, as by Sir J. Herschel in 1838; and in the interval they had, instead of merely gaining the aphastre without sensible change of angle of position, really made a whole revolution, and altered that angle by 360°. The period is about 77 years; the mass three-fourths of the solar; the greatest distance 22″·5, the least distance 0″·5; and the periastre takes place in 1851·5, when, on account of the excessive excentricity of the orbit, the change of angle of position will be actually 2° 40′ per day.

That will, therefore, be a most crucial period for testing the theory by observations of the facts; and affords the very best and strongest instance for it of all the double stars yet discovered; in addition to which, the accurate determination of the parallax of the star by Professor Henderson gives it a crowning importance.

2. On the Colouring Matter of the *Morinda citrifolia*. By Dr Thomas Anderson.

The substance examined by the author was imported into Glasgow from Bombay, under the name of sooranjee, as a substitute for madder, but had been found useless by the dyers. No information could be obtained regarding its botanical origin in this country, but the importers having written to their correspondents received a quantity of seeds, labelled, Seeds of the Sooranjee plant, *Morinda citrifolia*. These seeds did not germinate, but agreed in their characters with those of *M. citrifolia;* and, for reasons stated at length in the paper, are considered by Dr Balfour to belong to that plant.

The colouring matter to which the author applies the name of morindine, was extracted from the bark of the root by boiling alcohol, and purified by successive crystallizations, and finally by solution in boiling spirit, acidulated with hydrochloric acid, which was found necessary for the separation of the last traces of ash. It then was in the form of minute acicular crystals of a fine yellow colour.

and satiny lustre, sparingly soluble in water, and in cold alcohol, but much more so in boiling dilute spirit, from which it is deposited on cooling, and insoluble in ether. It dissolves in alkalies with a fine red, and in sulphuric acid with a violet colour, and is decomposed by heat with the production of a crystalline sublimate. The analysis gave the following results:—

Carbon, .	55·46	55·40	55·39
Hydrogen, .	5·19	5·03	
Oxygen, .	39·35	39·57	
	100·00	100·00	

From which the author deduces the formula $C_{28}\ H_{15}\ O_{15}$, which differs from that of sublimed madder purple, the probable formula of which is $C_{28}\ H_{16}\ O_{16}$, by a single equivalent of water only. It approaches very closely in many chemical characters to the madder colouring matters, but differs from them in its relations as a dye. For the author had found that it was incapable of producing colours with alum and iron mordants, but with turkey-red mordant it produces a dark red.

By the sublimation of morindine, the author obtained another substance, to which he gives the name of morindone, in the form of fine red needles of considerable length, and which is insoluble in water, both hot and cold, but soluble in alcohol and ether. It dissolves also in alkalies with a magnificent purple colour, and in strong sulphuric acid, with the same colour. The author had been able to make only an imperfect analysis of this substance, the results of which approximated to the formula $C_{28}\ H_{10}\ O_{10}$, and should this be confirmed, would differ only from madder red by a single equivalent of water, and be a polymeric of gentianine.

The author concluded by remarking that morindine formed the type of a new class of colouring matters, fixing only on turkey-red mordant, which would, in all probability, throw some light on the obscure subject of the theory of turkey-red dyeing.

3. An Attempt to improve the present Methods of determining the Strength and Direction of the Wind at Sea. By Professor C. P. Smyth.

The laxity of the present methods having been brought, by his friend Captain Cockburn, R.N., before the author, with a desire to be furnished with some sort of anemometer, and with some easy means of eliminating the effect of the motion of the vessel, he began to consider what would be the *most appropriate* form of anemometer to be used at sea; for several kinds had been already tried, but had failed, as he thought, from not being constructed on a suitable principle. The species which the author considered the best, was that which should imitate, as nearly as possible, *mutatis mutandis*, the log-line by means of which the ship's way through the water is determined; for that instrument seems to have preserved its situation and supremacy over all others on board-ship amongst all nations, and from the time of Columbus to the present, mainly on account of the appropriateness of the principle involved. After describing several means by which the principle might be imitated to different degrees, the preference was given to Mr Edgeworth's anemometer, in which a horizontal wheel, armed with hemispheres on the end of each spoke, revolves in the *same direction*, from *whatever quarter* the wind may blow; and the centre of each cup moves at one-third the velocity of the current, by reason of the greater force of the wind on the concave than on the convex side. A series of experiments was entered on to determine the best shape and size to give the machine in practice, and the result at length arrived at was exhibited on the table, in the form of an anemometer with four horizontally revolving arms, on the ends of which were hemispheres, each four inches in diameter, with a radial distance of six inches. An endless screw on the vertical axis of this revolving part gave motion to a train of wheels which served to count the number of revolutions made in a given time. A weight of 1½ grains in the centre of one of the cups, was found sufficient to overcome the resistance to motion.

Some experiments were described which seemed to shew that the instrument could be fully depended on, and that the *strength* or *velocity* of the wind at sea might now be always entered in the log-book, as being of so many knots per hour, instead of in the usual unmeaning manner; and as the vanes actually used in ships give the *direction* of the wind with sufficient accuracy, all the elements necessary for eliminating the effect of the motion of the ships, or for deducing the true wind from the apparent one, may be assumed as being attainable, but the description of the practical method proposed for adoption was deferred for the next Meeting.

The author next described the problem of determining the true wind from the observed motion of the vessel and the apparent wind, as being merely a special instance of the general theorem of the parallelogram of forces, the course of the ship being one side; the apparent wind, the diagonal; and the true wind, another side; so that the case might always be reduced to the calculation, according to the usual rules for plane triangles, of the third side and one of the angles of a triangle, from the two other sides of their included angle, excepting in the simpler conditions of going exactly with or against the wind.

But as the calculations in this way, though easy enough, threatened to be uselessly and overpoweringly burdensome, considering the enormous number of cases which would have to be computed in any voyage, the small degree of accuracy required, and the untoward nature, for trigonometrical calculations, of the data as observed for the ordinary purposes of navigation,—the author contrived a simple set of scales, in which, *entering* with the directions and velocities of the ship and apparent wind, as usually observed, the direction and velocity of the true wind are given at once by inspection; and might be inserted, with very little trouble to naval officers, in two appropriate columns introduced into the log-books, as kept at present.

The following Donations to the Library were announced:—

First Report on the Coals suited to the Steam Navy. By Sir Henry De la Beche and Dr Lyon Playfair. 8vo.—*By Sir Henry De la Beche.*

The American Journal of Science and Arts. Conducted by Professors Silliman and Dana. Second Series. January 1848, No. 13. 8vo.—*By the Editor.*

Bouet-Villaumez (Le Comte E.) Description Nautique de l'Afrique Occidentale. 8vo.

Petit-Thouars (Abel du). Voyage auteur du Monde sur la Frégate la Vénus. Tom. VI., VII., VIII., IX., X. (Physique, par U. de Tessan. Tom. I., II., III., IV., V.) 8vo.

—— Atlas Hydrographique du même. Imp. Fol.

Collection des Cartes des Côtes de France. Imp. Fol. (In sheets.)

Beyat (P.) Traité de Géodésie a l'usage des Marins. 8vo.

—— Exposé des Opérations Géodésiques. 1839. 4to.

Beyat. Le même. 1844. 4to.

Jehenne (M.) Renseignements Nautiques sur Nossi-Bé, Nossi-Mitsiou, Bavatoubé, &c. 8vo.

Urville (J. Dumont d') Voyage au Pole sud, et dans l'Océanie, sur les Corvettes L'Astrolabe et la Zelée. 8vo.

Daussy (M.) Nouvelle Méthode pour calculer la Marche des Chronomètres. 8vo.

—— Table des Positions Géographiques des principaux lieux du Globe. 8vo.

Brossay (M. Chiron du). Instructions Nautiques sur l'Attérrage et la Navigation de la Platte. 8vo.

Maucroix (M. D'Estremont de). Note sur le Banc de Feroë. 8vo.

Moutravel (L. Tardy de). Instructions pour naviguer sur la Côte Septentrionale du Brésil et dans le fleuve des Amazones. 8vo.

Condé (M. de Maussion). Notice sur le Golfe de Honduras. 8vo.

Bourdieu (L. du). Notes sur quelques Ports de l'Ile de Haïti. 8vo.

Keller (F. A. E.) Des Ouragans, Tornados, Typhons, et Tempêtes. 8vo.

Périer (M. du). Notes sur l'Attérrissage du Rio de la Plata. 8vo.

Kerhallet (Charles P. de). Instruction pour remonter la Côte du Brésil. 8vo.

Jehenne (M.) Renseignements Nautiques sur l'Ile Mayotte. 8vo.

Lartigue (M.) Exposition du Système des Vents. 8vo.

Pagel (Louis). La Latitude par les Hauteurs hors de Méridien. 8vo.

Presented by the French Government, Marine Department.

Spittal (Robert), M.D., Introductory Discourse on Pathology and the Practice of Medicine. 12mo.—*By the Author.*

Journal of the Statistical Society of London. Vol. II. Part 1. March 1848. 8vo.—*By the Society.*

Monday, 17*th April* 1848.

DR CHRISTISON, V.P., in the Chair.

The following Communications were read:—

1. On the Action of the Dry Gases on Organic Colouring Matters, and its relation to the Theory of Bleaching. By Dr George Wilson.

This communication is divided into six sections. In the first, the author states that the object of his paper is to supply a defect in the theory of chlorine-bleaching, by endeavouring to explain why the removal of water from that gas arrests its bleaching action. In the preliminary discussion, he refers at some length to Davy's theory, that moist chlorine does not bleach directly, but only in a secondary way, by combining with the hydrogen of the associated water, and liberating the oxygen, which is the true bleacher. After pointing out the untenable assumptions and self-destructive arguments on which this theory is built, the author proceeds in the second section, which discusses the influence of sunlight on the bleaching action of dry chlorine, to shew, that Davy's proposition that dry chlorine does not bleach dry organic colours is true, provided direct sunlight be excluded, but does not apply to the gas when exposed to the actinic influence of the sunbeam. In a comparative trial, one specimen of dry litmus paper was found to resist the decolorizing action of dry chlorine for more than eight months when kept in darkness; whilst the colour of another portion of the same paper totally disappeared after six weeks' exposure to sunshine. Another comparative experiment was not so successful as regarded rapidity of actinic bleaching; but both sets of trials led the author to infer, that darkness as well as dryness is essential to the negative action of chlorine on colours.

The third section is occupied with the record of experiments, instituted with a view to determine whether the presence of water is as essential to the bleaching action of oxygen, sulphurous acid, and sulphuretted hydrogen, as it is to that of chlorine. The general result of the trials made was, that the gases mentioned may be retained, when dry, for months over dry litmus, without decolorizing it; and that they are, therefore, at least as much dependent as chlorine on water for their power of bleaching.

The fourth section investigates, in like manner, the extent to which the acid gases and ammonia have their power to change organic colouring matters, influenced by the absence of water from the gas and the colour. The author finds that the modifying action of carbonic, sulphurous, and hydrosulphuric acids on colours, is totally arrested by the abstraction of water; and that that of hydrochloric acid and ammonia is long delayed. He infers, from the results detailed in sections third and fourth, that there is nothing exceptional or anomalous in the non-bleaching action of dry chlorine, and that it is only a particular case of a general law, applying to all gases which affect colours, and teaching that elastic fluids, when anhydrous, lose in whole, or in part, the power to destroy or change the tints of organic bodies, which they possess when associated with water.

Section fifth reviews the methods employed for drying gases, and the tests of gaseous dryness. It enters at length into the question, how far it is possible to confer absolute dryness on an elastic fluid, and suggests some modifications of the processes at present in use, which the author thinks will prove serviceable. Non-action on colouring matter is likewise pointed out as a negative test of dryness of some value, in relation to the gases which act on colours.

Section sixth is devoted to the question, Does water accelerate the action of gases on colours, in virtue simply of its conferring mediate liquidity on the gas? The author thinks not, and refers to the slow action which he has observed of liquid anhydrous bromine and sulphurous acid on blue litmus, as contrasted with their rapid production of destruction or modification of colour when dissolved in water, as shewing that the liquefaction of the gas is not the only cause of its rapid action when moist. He contends that this is only to be fully accounted for by taking into consideration the power of water to liquefy *both* the colouring matter and the gas, and thus to bring them into a closeness of physical contact in the highest degree favourable to energetic chemical action. The author was led, in connection with this view, to infer that dry gases would act on dry colours in other liquids besides water, provided only these could dissolve both the gas and the colouring matter. He finds, however, that this cannot be laid down as a general proposition, at least so far as chlorine is concerned, the only gas on which he has had opportunity to make researches in reference to this point. The volatile oils of the type of spirit of turpentine ($C\ 5, H\ 4$) and chloroform, which contain no oxygen, and sulphuret of carbon, which contains neither of the elements of water, dissolve the colouring principle of alkanet root, and also chlorine, but the gas does not destroy the colour. Solutions of dry litmus, on the other hand, in chloroform and sulphuret of carbon, are instantly bleached by dry chlorine.

The author's final conclusion is, that the function of water in bleaching, speaking generally, is to dissolve the colour and the gas, and so to bring them within the sphere of chemical affinity; and that water is more efficacious in accelerating bleaching than other liquids, simply because it excels most of them in solvent power.

2. On the Products of the Destructive Distillation of Animal Substances, Part I. By Dr Thomas Anderson.

In this communication the author details the general properties of bone-oil, the substance employed in his experiments, and those of certain of the volatile bases contained in it.

The oil was first rectified, and the product collected in two separate portions, each of which was separately agitated with dilute sulphuric acid for the separation of the bases. The acid solution so obtained was then boiled down to a small bulk for the purpose of separating any non-basic oil which might have been dissolved, and distilled with potash, soda, or slaked lime. The bases passed over in solution in water, from which they were separated by means of solid caustic potass; similar processes were performed with both portions of the bone-oil, but in the present paper the author confines himself to the pure volatile portion only.

The oil separated by this process from the more volatile portion was found to be a mixture of at least four or five different bases, which were separated from each other by fractionated distillation.

The most volatile of these, which boils at about 175° Fahr., was present in extremely minute quantity only. For it the author proposes the name of petinine (from πετεινος, volatile.) It is a transparent colourless fluid, highly soluble in water, alcohol, and ether. The smell is pungent, and resembles that of ammonia, but is accompanied by the odour of decaying apples. It gives, with chloride of gold, a pale-yellow precipitate, and with bichloride of platinum and corrosive sublimate, beautiful crystallisable salts, the former resembling iodide of lead, the latter in pearly plates. The analysis of petinine gave results corresponding with the formula $C_8 H_{10} N$, which was confirmed by the constitution of the platinine salt, the formula of which was found to be $C_8 H_{10} N, H Cl, Pt. Cl_2$. The author details, as far as the minute quantity at his disposal would allow, the properties of the salts of this base.

He then takes up the consideration of that portion of the mixed basis, which distilled between 270° and 280°, which, after successive rectifications, was found to give the formula $C_{12} H_7 N$, and to agree in all its properties with the base formerly obtained by the author from coal-tar, and described under the name of picoline. Aniline was also found present in that portion of the mixed tars which distilled above 355°, and was distinguished by its reaction with chloride of lime.

The author also mentions the existence of several other bases, the constitution and properties of which will be described in the second part of his researches.

3. Note respecting the Refractive and Dispersive Power of Chloroform. By Professor Forbes.

From an experiment made in very cloudy weather, and therefore rather unfavourable light, I determined the following indices of refraction for pure chloroform, prepared by Dr George Wilson, of sp. gr.

The measure of the refracting angle of the prism was 39° 41′. References were made to the principal lines of the spectrum, as below, the temperature of the fluid was probably 54°.

Extreme red, . . .	$\mu =$ 1·4475
B (in the red), ...	1·4488
D (in the orange-yellow), . . .	1·451
b (in the green), ...	1·456
F (in the blue), ...	1·457
H (in the violet, being the least refrangible of the two groups so designated), . .	1·463
Extreme violet, ...	1·4675

Hence the refractive index is by no means remarkably great, being nearly that of wax, spermaceti, and several of the essential oils.

The dispersive power, or $\frac{\text{sp.}}{\mu - 1}$ is equal to ·045, which again agrees nearly with that of the essential oils. The high specific gravity of the body appears to have no marked influence in increasing its action on light.

The following Gentlemen were duly elected Ordinary Fellows:—

Dr Patrick Newbigging.
W. Swan, Esq.

The following Donations to the Library were announced :—

Greenwich Magnetical and Meteorological Observations, 1845, 4to. —*By the Observatory.*

Annales des Sciences Physiques et Naturelles, d'Agriculture et d'Industrie, publiées par la Société Royale d'Agriculture, &c., de Lyon. Tom. IX., 1846. 8vo.—*By the Society.*

Abhandlungen der Königl. Gesellschaft der Wissenschaften zu Göttingen. 3 Bde. 1845-47. 4to.—*By the Society.*

Philosophical Transactions of the Royal Society of London, for 1847. Part II. 4to.

List of Fellows of the Royal Society. 4to.

Proceedings of the Royal Society. 1847, No. 69. 8vo.—*By the Society.*

Proceedings of the American Academy of Arts and Sciences. January 27, 1847—January 4, 1848. 8vo.—*By the Society.*

Handbuch der Mineralogie von J. F. L., Hausmann. Theil 2. 8vo. —*By the Author.*

Thoughts on the Principles of Taxation, with reference to a Property Tax, and its exceptions. By Charles Babbage, Esq. 8vo.—*By the Author.*

Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences. Tom. XXIV., No. 11, to Tom. XXVI., No. 11. 4to.—*By the Academy.*

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